An Application of Flower Pollination Algorithm to Solve Combined Economic Emission Dispatch by Considering Valve-Point Loading Effect

Hong Mee Song, Mohd Herwan Sulaiman, Mohd Rusllim Mohamed
Faculty of Electrical & Electronics Engineering, Universiti Malaysia Pahang

ABSTRACT
Flower Pollination Algorithm (FPA) is a new biologically inspired meta-heuristic optimization technique based the pollination process of flowers. FPA mimics the flower pollination characteristics in order to survival by the fittest. This paper presents implementation of FPA optimization in solving Combined Economic Emission Dispatch (CEED) problems in power system. CEED actually is a bi-objective problem where the objective of economic dispatch (ED) and emission dispatch (EMD) are combined into a single function by using price penalty factor. Hence, CEED is used to minimize the total generation cost by minimizing fuel cost and emission concurrently and at the same time determines the optimum power generation. In this paper, the valve point loading effect problem in power system also will be considered. The proposed algorithm are tested on four different test systems which are: 6-generating unit and 11-generating unit without valve point effect with no transmission loss, 10-generating unit with having valve point effect and transmission loss, and lastly 40-generating unit with having valve point effect without transmission loss. The results of these four different test cases were compared with the optimization techniques reported in recent literature in order to observe the effectiveness of FPA. Result shows FPA able to perform better than other algorithms by having minimum fuel cost and emission.

KEYWORDS: Combined Economic Emission Dispatch; Economic Dispatch; Emission Dispatch; Flower Pollination Algorithm; Valve Point Loading Effect

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